REMARKS

In view of both the amendments presented above and the following discussion, the Applicants submit that none of the claims now pending in the application is obvious under the provisions of 35 USC § 103. Thus, the Applicants believe that all of these claims are now in allowable form.

If, however, the Examiner believes that there are any unresolved issues requiring adverse final action in any of the claims now pending in the application, the Examiner should telephone Mr. Peter L. Michaelson, Esq. at (732) 530-6671 so that appropriate arrangements can be made for resolving such issues as expeditiously as possible.

Specification amendments

Various amendments have been made to the specification to correct minor inadvertent grammatical, spelling, punctuation and formal errors.

Status of Claims

To conform their claims to the dictates of proper US claim practice, the Applicants, in light of the separate amendments that would need to have been made to their claims, have instead simply chosen to cancel their existing claims 1-25 and replace them with new claims 26-50.

Claims 26-50 substantively correspond on a 1:1 basis with prior claims 1-25, respectively.

Claim Objections

The Examiner has objected to prior claims 13 and 14 owing to their inclusion of the term "preferably". Specifically, claim 13 recited "8 to 12 degrees, preferably 10 degrees", and claim 14 recited "3 to 6.5 degrees, preferably 5 degrees."

Claims 38 and 39, which respectively correspond to canceled claims 13 and 14, do not recite the phrase "preferably 10 degrees" and "preferably 5 degrees", as existed in prior claims 13 and 14, respectively.

Hence, this objection should now be withdrawn.

Rejections under 35 USC §103

The Examiner has rejected claims 1-25 under the provisions of 35 USC § 103 as being obvious over the teachings in the Johnson et al patent (United States patent 6,088,002 (issued to T. Johnson et al on July 11, 2000) taken in view of the Tsui et al application (United States patent application 2003/0003959 published on January 2, 2003). Inasmuch as all these claims have now been canceled, this rejection is moot. Nevertheless, since these claims have been replaced by new claims 26-50, then, to expedite prosecution, this rejection will be discussed in the context of these new claims and principally with respect to new independent claim 26. In that context, this rejection is respectfully traversed.

In particular and with respect to canceled independent claim 1 (to which new independent claim 26 corresponds), the Examiner takes the position that the Johnson et al patent discloses various elements of that claim. Specifically, the Examiner states that the Johnson et al patent shows: a telecommunications radio system for mobile communication services, a base station, the base station comprising at least two antennas, the base station being located at a site and covering an area where the site is a high structure with a height of at least 50m from the ground (erection ground), the base station is also located on the site at a height of at least 50m from the erection ground and the two antennas are arranged in a first concentric ring in a first orthogonal plane of the longitudinal axis of the site. The Examiner concedes that the Johnson et al patent does not teach the concept of a coverage area being subdivided, by the antennas, into a multitude of sectors. Given this deficiency, the Examiner turns to the Tsui et al application for these missing teachings, i.e. an antenna pattern partitioned into sectors to aid in efficiently increasing downstream transmission capacity. With his view of the teachings in the Johnson et al patent and the Tsui et al application, the Examiner then concludes that it would have been obvious to one of skill in the art at the time the present invention was made to have modified the teachings of the Johnson et al patent by those in the Tsui et al application and, by so doing, arrive at the present invention. As the Examiner will soon appreciate, his view of both the teachings in the Johnson et al patent and his overall conclusion of obviousness, at least with respect to claim 26, are incorrect.

The Examiner is correct in recognizing that the Johnson et al patent teaches a number of the limitations of claim 1. However, this patent does not go as far in its teachings as the Examiner evidently believes it does.

Specifically and to the extent relevant, the Johnson et al patent discloses a modular antenna system mounted on a supporting structure and for use with wireless communications. As shown in FIGs. 1-3 and described in, e.g. col. 2, line 43 et seq of this patent, the antenna system is formed of panels 5, between 1 - 20 in number, with each panel having 32 dipole elements 10 arranged in a 4-row by 8-column matrix. The panels are themselves arranged in closed outer ring 2 that is connected to inner ring 3 by horizontal beams or struts 4; the inner ring being connected, in turn, to mast 6. Each panel consists of horizontal beams 7, vertical grid bars 8 and vertical transformer beams 9. The dipole elements are mounted onto beams 9. A number of low wind antenna boxes 11 is situated within the mast and are enclosed by the inner ring. As indicated in col. 3, lines 22 et seq, these antenna boxes may contain "duplex filters, low noise amplifiers, transmitter power amplifiers and combiners". Further, the antenna panels, specifically each reflector, may be varied as needed to accommodate various environmental (including weather) and physical factors, as indicated in col. 4, lines 57-65. These panels can be mounted on a building or mast.

Furthermore, for each panel, as indicated in col. 2, line 46 et seq, the vertical size and gain of that panel can be varied by using 2, 4 or 6 dipoles in each

column on that panel and with different dipole row variants (presumably the number of dipoles per row) to accommodate specific frequencies, bandwidth, lobe tilt, null fill-up, connector location and wind area. All of these variations will have the same fixing holes and location and are thus selectable at installation or modifiable after installation if the network structure or traffic demand changes. See, col. 2, line 50 et seq.

In view of this, the Applicants agree with the Examiner that the Johnson et al patent shows a base station and at least two antennas, with the base station being located at a site. This much is clear.

However, directly contrary to the Examiner's view, the Johnson et al patent contains absolutely no mention of the height to which the antenna system is to be mounted. In that regard, the Examiner points to col. 2, lines 43-49 as teaching that "the antenna system is modular and can be configured, mast variants, thus the height of the structure can be varied and made greater than or equal to 50m". While this portion of the specification of the Johnson et al patent does teach modularity and panel variants, this portion, set forth below, is totally devoid of any reference as to the proper height at which the entire antenna structure should be mounted:

> "The antenna system is modular and can be configured by: Number of panels 1-20 for maximum gain and directionality. Mast or building mounted reflector variants with different environmental backlobe and wind loads. Vertical height and gain variations 2-4-(6) dipoles. Different dipole row variants for: frequency,

> bandwidth (BW), lobe tilt, null fill up, connector location, wind area."

The only reference to height is merely to the vertical dimension of the panel itself and is based upon whether the panel contains 2, 4 or 6 rows of dipoles with obviously its vertical dimension increasing as more antenna rows are used. As one can appreciate from FIG. 3, the vertical height (more aptly the vertical dimension, but not specifically marked) of the 4-row panel shown in this figure will be half that shown for a 2-row panel but half again as much (50% more) for a 6-row panel.

The Examiner, in asserting that the Johnson et al patent teaches that the base station is located at a height of at least 50 m above the ground references the same portion of the specification, i.e. col., 2, lines 43-49 and also col. 4, lines 1-5. Each of these portions fails to support the Examiner's assertion. The former portion is discussed immediately above. As to the latter portion, it expressly states:

> "The radio tower or mast is complemented with phased array antennas installed together with the *existing antennas* in order to permit continuous operation of the analog system during the installation of new hardware." [emphasis added]

Not only does this latter portion provide no support, when viewed in the context of common knowledge in the art at the time, it actually teaches directly away from the Examiner's assertion. Specifically, this portion explicitly teaches that the inventive antenna panels taught by the Johnson et al patent, which can be implemented by phased array

elements, are mounted together with existing, i.e. conventional, antennas. Why is this restriction important? Because, conventional wisdom at the time taught that base station cellular antennas had to be mounted at relatively low heights above the ground.

Specifically, the present Applicants note on pages 1-2 of the present specification, that, in practice, for cellular systems that rely on area sectorization (where a hexagonal cell area is divided into, for example, six sectors through the use of separate antennas with different aperture angles), deviations from the theoretical and ideal sector shape regularly occur. These deviations are caused by landscape, traffic and non-ideal locations of a base station. Such deviations adversely affect coverage and capacity.

Generally, a base station is located in the center of an area which it is to serve and, as such, divides that area into a maximum number of sectors, e.g., six. As the Applicants note, conventional wisdom in the art, is not to use high base stations because doing so would cause a considerable degree of undesirable interference between adjacent sectors and possibly between adjacent cells. Consequently, conventional approaches position base stations and their antennas relatively low to the ground, generally below 50m in height.

Recently, wireless carriers throughout the developed world have acquired licenses to operate UMTS (Universal Mobile Telecommunications System) networks and hence have a need to quickly build an extensive UMTS radio

network covering at least relatively large cities in the developed world. Unfortunately, a considerable shortage exists of new locations that would be suitable for UMTS base stations and also difficulties arise in negotiating access to those existing locations that could suitably accommodate such a base station. Consequently, wireless carriers are experiencing a considerable loss of time as a result of having to co-ordinate their efforts with other parties as well as frequently re-plan their UMTS radio networks based on then available sites. Hence, current deployment of UMTS radio networks is only progressing at a rather slow pace and at significant financial cost to carriers. Compounding this problem is the fact, that, if base stations were to be physically sited in accordance with conventional teachings, i.e., using sectorized approaches with low height antennas as discussed above, then the resulting network will contain numerous holes (gaps) in coverage.

Advantageously and as discussed in page 4, line 19 et seq of the present specification, the Applicants have discovered -- contrary to conventional wisdom in the art -- a new approach to configuring base stations, in terms of height and antenna geometry, that permits use of a far greater range of sites than heretofore possible and can be deployed quickly and relatively inexpensively. The present invention can also accommodate any size or shape of any covered area and can easily change user capacity in that area. The invention is applicable to any mobile telecommunications system which relies on sectorization, namely, e.g., GSM, TDMA, CDMA and UMTS.

Essentially and as discussed in page 4, line 29 et seq, the inventive base station configuration involves a plurality of antennas (at least two) with each antenna serving a corresponding sector, or one or more phased-arrays serving a multitude of sectors. Contrary to established and conventional wisdom, the present invention relies on siting the antennas at a relatively high height, i.e. at least 50m high and preferably in the range of 90m - 320m above ground level on which a mast or other structure, to which the antennas are mounted, is erected. Using such a height, particularly with a relatively large number of sectors, provides mobile coverage over a fairly wide area. Through such an approach, far fewer base stations are needed to cover a given area than would be required with a relatively low siting height, hence resulting in significant savings in construction and equipment time and cost, and maintenance time and cost, as well as further savings that can result, when co-locating the inventive base stations with existing base stations, from sharing power supplies and cabling. Furthermore, as indicated on page 10, line 11 et seq, through the inventive arrangement, coverage gaps can be greatly reduced, if not eliminated.

In accordance with the present inventive teachings, the antennas are arranged in first ring orthogonal to and concentric with a longitudinal axis of the site. Antennas can also be arranged in a second concentric ring that has a larger diameter than the first ring. A multi-ring arrangement is shown in Fig. 1 and described in, e.g., page 9, line 25 et seq of the present application. Through these arrangements, fairly dense sectorization results which, in turn, permits sufficient power flow

density at ground level and sufficient user capacity. Rather than merely using 6 sectors as is conventionally taught, the present invention can define 24 sectors through use of 24 antennas in the first (inner) ring (a 15 degree horizontal angular range for each such antenna) with the second (outer) ring defining 72 more sectors through the use of 72 antennas in that ring (with a 5 degree horizontal angular range for each such antenna). The vertical aperture range of the antennas in the first ring would be 10 degrees to cover a distance range of 1km - 3.2km at approximately 10 degrees of tilt, with the antennas in the second ring having a vertical aperture range of 5 degrees to cover a distance range of 3.2km - 6.4km at approximately 2.5 degrees of tilt. This resulting sectorization is shown in Fig. 2.

Thus, as the Examiner should now appreciate, the Applicants teach an approach for arranging a base station that is directly contrary to the conventional wisdom, including the conventional rather low height restriction inherent in the teachings of the Johnson et al patent.

As to the Tsui et al application, the Applicants agree with the Examiner's view that, to the extent relevant, the Tsui et al application teaches the known concept of sectorization, i.e. that antennas can be used to divide a coverage area into individual sectors. The Applicants' make no claim to sectorization in and of itself -- as that concept is very well established in the art and has been so well prior to the filing date of the Tsui et al application.

However, the Tsui et al application, just like the Johnson et al patent, is utterly devoid of any mention of

the height of base station antennas. Consequently, any combination of the teachings of the Tsui et al application with those in the Johnson et al patent would be constrained by the explicit teachings in the Johnson et al patent that the antennas would be mounted together with existing, i.e. conventional, antennas, which, when viewed in light of conventional wisdom in the art, means that the antennas would be mounted relatively low to the ground. This, in turn, would result in the very same problems discussed above and inherent in the art, including the Johnson et al patent, when applied to UMTS radio network deployment -- problems which are now advantageously solved by the present Applicants.

It remained for the Applicants and only the Applicants to remedy those problems.

New independent claim 26 contains suitable recitations directed at the distinguishing aspects of the present invention. In that regard, this claim recites as follows with those recitations indicated by a bolded typeface:

> "A telecommunications radio system for mobile communication services comprising a first base station having a plurality of antennas and located at a site, the base station covering an area subdivided into a multitude of sectors by the antennas, wherein:
> **the site comprises a structure with a height of at least 50m from erection ground;**
> **the base station is located on the site at a height of at least 50m from erection ground; and**
> **at least two of the antennas are arranged in a first ring situated in a first plane orthogonal to and concentric with a longitudinal axis of the site."**
> [emphasis added]

Independent claims 48, 49 and 50 each contain nearly identical limitations to those set forth in claim 26, though with claims 48, 49 and 50 respectively directed to a base station, antenna and mobile network, rather than to a telecommunications radio system as recited in claim 26.

Furthermore, while the Examiner apparently interpreted the limitation of prior claim 1 "orthogonal plane of the longitudinal axis" to imply that this plane is oriented in a vertical direction, i.e. parallel to the axis, this orientation is not correct. As the Examiner can plainly see from Fig. 1 of the present application, the plane is oriented in a horizontal direction perpendicular to the axis. To clarify this aspect, claim 26 (as does claims 48, 49 and 50) recites the plane as being "orthogonal to ... a longitudinal axis of the site" and hence horizontally aligned.

There are simply **no** teachings, whether explicit or implicit, in the Johnson et al patent and Tsui et al application that show, disclose or suggest, whether implicitly or explicitly, the distinguishing aspects of the present invention and accordingly the corresponding recitations indicated above.

Accordingly, none of the independent claims is rendered obvious by the teachings in these two applied references, whether those teachings are taken solely or combined in any manner including that posed by the Examiner. Hence, all of these independent claims are patentable under the provisions of 35 USC § 103.

Each of claims 27-47 depends, either directly or indirectly, from independent claim 26 and recites further distinguishing features of the present invention. Accordingly, each of these dependent claims is also not rendered obvious by the teachings in the Johnson et al patent and Tsui et al application for the exact same reasons set forth above with respect to claim 26. Hence, each of these dependent claims is also patentable under the provisions of 35 USC § 103.

Conclusion

Thus, the Applicants submit that none of the claims, presently in the application, is obvious under the provisions of 35 USC § 103.

Consequently, the Applicants believe that all these claims are presently in condition for allowance. Accordingly, both reconsideration of this application and its swift passage to issue are earnestly solicited.

Respectfully submitted,

November 21, 2005

Peter L. Michaelson, Attorney
Reg. No. 30,090
Customer No. 007265
(732) 530-6671

MICHAELSON & ASSOCIATES
Counselors at Law
Parkway 109 Office Center
328 Newman Springs Road
P.O. Box 8489
Red Bank, New Jersey 07701

CERTIFICATE OF MAILING under 37 C.F.R. 1.8(a)

I hereby certify that this correspondence is being deposited on **November 21, 2005** with the United States Postal Service as first class mail, with sufficient postage, in an envelope addressed to the Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Signature

30,090
Reg. No.

(PTT199AMEND/ca:161)